GB1443113

Title:
BINDER ELEMENT

Abstract:

1443113 Bookbinding; filing papers MIN- NESOTA MINING & MFG CO 12 Aug 1974 [13 Aug 1973] 35500/74 Headings B6A and B6E A binder element, e.g. of plastics material, for permanently binding together apertured sheets 21, comprises a first spine 17 having studs 27 provided with ratchet teeth 29, and a second spine 19 having complementary openings each with a wall provided with at least one ratchet tooth 41 thereon extending into the opening and adapted to engage the ratchet teeth of the corresponding stud, a locking block 43 for each opening being adapted to fit into the opening to hold the ratchet teeth of the two spines in engagement. Each locking block is attached adjacent its respective opening by a thin web 45 which may be broken, or may act as a hinge, as the block is forced into the opening. The protruding portions of the studs are cut off. The studs may be of circular, oval or rectangular cross-section. In the latter case, only one face of each stud, except the centre stud (33) is pro- vided with ratchet teeth, Fig. 2 (not shown). The spines have sheet engaging points 49, 51.

PATENT SPECIFICATION

(11) 1 443 113

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B6A 21F
B6E 19F4B

(54) BINDER ELEMENT

(71) We, MINNESOTA MINING AND MANUFACTURING COMPANY, a corporation organised and existing under the laws of the State of Delaware, United States of America, of 3M Center, Saint Paul, Minnesota 55101, United States of America, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to binder elements for books and the like which can be used to bind a sheaf of papers together into a book. The binder elements of the present invention can be easily applied to sheaves of paper of different thicknesses and can be applied with very simple equipment or can even be applied without the use of mechanical equipment of any kind.

A need exists in libraries and other institutions for replacing the bindings on books or providing permanent bindings on magazines or the like, which are ordinarily of a temporary nature, and which would be destroyed through normal use. In the past it has been necessary for libraries to send out such books or publications for the application of permanent bindings, but the device of the present invention allows the library to bind its own materials. Thus the material is out of circulation for only a relatively short time, and the binding is economical.

In many industries a similar need exists for binding together price lists, catalogue sheets, instruction booklets and the like.

Various proposals have been made in the past for such easily applied bindings, but they have not been fully successful, mostly due to the fact that they require relatively expensive machinery for clamping the binding elements together and frequently require the application of heat or at least great mechanical pressure. Although the binder elements of the present invention can be advantageously assembled using simple machinery, they can also be merely pressed together by hand.

Accordingly the invention provides a binder element for an apertured book or the like, comprising a first spine having a plurality of elongate studs extending therefrom, said studs each having at least on one side thereof a plurality of ratchet teeth, a second mating spine having complementary openings of a size for the reception of said studs, each of said openings being defined by a wall having at least one ratchet tooth thereon extending into said opening and adapted to engage the ratchet teeth on a co-operating stud extending into the opening from the first spine, and locking means adapted to be moved into said openings when the spines are assembled together thereby holding said ratchet teeth of the two spines in engagement with each other.

Preferably, the binder elements of the present invention are made of plastics material so that they can be injection moulded in large quantities economically.

Hereinafter the invention is further described by way of example and with reference to the accompanying drawings wherein:—

Figure 1 is a perspective view of a book bound in accordance with the present invention;

Figure 2 is an enlarged, exploded, perspective view of binder elements embodying the present invention;

Figure 3 is a side view showing in diagrammatic form the first stage of applying binder elements embodying the present invention;

Figure 4 is a view similar to Figure 3, showing the next stage of applying the binder elements;

Figure 5 is a view similar to Figure 3, showing the final stage of applying the binder elements;

Figure 6 is a side view of one of the

binder elements having studs;

Figure 7 is a sectional view taken along line 7—7 of Figure 6;

Figure 8 is a sectional view of the binder element having a series of mating holes;

Figure 9 is a sectional view taken along the line 9—9 of Figure 8;

Figure 10 is a sectional view of the binder element taken along the line 10—10 of Figure 8;

Figure 11 is a bottom view of the binder element of Figure 8 taken along the line 11—11;

Figure 12 is an enlarged sectional view of another embodiment of the invention;

Figure 13 is a partial sectional view, similar to Figure 12, showing the parts in the locked position, and

Figure 14 is a plan view on the line 14—14 of Figure 13.

Referring now to the drawings by reference characters there is shown a book generally designated 15 which is held in assembled relationship by a binding element including an upper binding strip 17 and a lower binding strip 19. The terms "upper" and "lower" are used only for convenience, since it is obvious that either side could be considered the top. The book 15 includes a plurality of sheets 21 of paper or the like, having a series of slots or holes 23 therein at appropriate intervals, as will later be apparent.

The upper binding strip 17 includes a spine 25, having a series of elongate studs 27, extending therefrom. Each of the studs 27 has a plurality of ratchet teeth 29 thereon, and the end of the stud is preferably pointed as at 31 for ease of insertion of the stud through the sheaf of papers and the opening in the mating binding strip 19.

The ratchet teeth 29 can be located on either side of the stud or, in a preferred embodiment of the invention, an odd number of studs is employed and the center stud has ratchet teeth on both sides thereof, as is shown at 33. With an odd number of studs, the ratchet teeth on each side of the central stud will point inopposite directions. This is most apparent in Figure 6, wherein the center stud is designated 33 while the studs to the left, as at 35, have the ratchet teeth pointing to the left while those on the opposite side designated 37 have the ratchet teeth pointed to the right. If an even number of studs is employed, it is not necessary for any stud to have ratchet teeth on both sides. Also, it will be apparent that the reason for having the ratchet teeth on each side of centre, whether the total number of studs be odd or even, point in opposite directions is that the user can install the backing member in either direction, while if all of the ratchet teeth point in the same direction, it will be necessary that the backing member be installed in only a proper orientation.

Each backing member consists of a spine 39 having a series of mating openings or apertures 40 corresponding in placement to the studs on the mating strio. Each of the apertures 40 is formed with at least one ratchet tooth 41 on a wall thereof, positioned to mate with the teeth on the studs and the opening is undercut as at 48. Although a single tooth has been found fully operative for the purposes of the present invention, two or more teeth can be employed. Adjacent to the aperture, and overlapping the aperture somewhat, is a block 43 which is formed integrally with the backing member but which is connected thereto only by a thin web 45 of the material from which the spine is formed. The clear aperture of the opening 40 with block 43 in place, is such that the stud can barely pass through the hole and will possibly push the block 43 slightly to one side, as is shown in Figure 4. Preferably block 43 is tapered as is shown at 50 to minimize binding of the block hinge 45. The opening 40 is provided wih a shoulder 47, and the clearances are such that when block 43 is detached and forced into the hole, the ratchet teeth will be fully engaged, preventing further movement.

Preferably one or both of the spines have a series of inwardly directed points which help engage and hold the papers in fixed relationship. Thus, the upper spine 17 may have a series of downwardly directed points 49, while the lower spine 19 has a series of upwardly directed points 51. In order to conserve plastics material and lighten the structure without unduly weakening it and making the unit more flexible, one or both of the spines may have relieved sections between the studs or holes such as those sections designated 53. These would not normally extend completely through the spine in order to preserve the smooth outline of the outer surface as well as to contribute strength to the structure. Thus, if the spine flexes, it will bend between the fastening elements and the fastening elements themselves will be rigid.

The manner of assembling the binding structure can be seen from Figures 3, 4 and 5. In Figure 3 a stack of paper 21 has been provided which has a series of holes or slots 23 therein, and the lower binding element 19 is placed under the attack with the openings 40 directly under the holes 23. The upper spine 17 is now placed over the stack of papers, and the studs 27 pushed into the holes 23. As is shown in Figure 4, as the stud encounters the block 43, it will be pushed aside slightly, bringing the ratchet teeth 29 into contact with the

single ratchet tooth 41, but web 45 has sufficient flexibility for the block to spring back, allowing the ratchet teeth to clear each other. When the spines come in contact with the stack of paper, they are preferably pushed together under a substantial pressure to secure a tight bundle. Now one presses inwardly on the block 43, rupturing the web 45 which was holding the block in place, and permitting the block 43 to be pushed upward and into the hole and against shoulder 47, holding the mating ratchet teeth firmly in engagement. In this embodiment of the invention, block 43 does not turn and it is pushed directly inward, as is shown by the rupture lines and any fragment of the hinge will fall into the undercut 48 as is shown at 52. It will now be seen that the parts are locked firmly in place and that the ratchet teeth are held together in a positive relationship so that there is no chance of slippage. The end of the stud 27 can now be cut off flush with the spine, as is shown at 55, to yield the finished bound volume.

In Figures 12 through 14, another embodiment of the invention is shown wherein the block is not ruptured from the spine but is merely turned upon itself within the aperture to lock the ratchet teeth together. This construction is particularly advantageous when using a somewhat soft plastics material such as polyethylene or polypropylene, which will bend a very substantial distance without breaking. The upper spine 17 having studs 27 and ratchet teeth is exactly the same as previously described. The lower spine 19A is provided with a ratchet tooth 41A, as before, but the locking block is substantially modified. The block, generally designated 57, is connected to the spine by means of a hinge section 59. The block 57 has a flat portion 61 extending at an angle of about 135° from the back of the spine and has an angling portion 63, extending therefrom at an angle of about 90° to side 61. The block 57 includes a centre portion 64 having a surface 65 which may be parallel to side 63. The distance between the surfaces 63 and 65 are such that, when the block is turned, as is shown in Figure 13, the teeth 29 and 41A will be locked firmly together. With this embodiment of the invention, the block is merely rotated into place when the spines have been squeezed together to the desired degree. As before, stud 27 is cut off flush with the back of the spine 19A.

Many variations can be made in the exact structure shown. For instance, the studs have been shown as substantially square in cross-section, but they might be rectangular, oval, or even round. Preferably the spines are formed from a hard plastics material which can be cast by injection molding such as vinyl, acrylic or ABS resin. Obviously, many other polymeric materials are suitable for this purpose. If desired, relatively soft plastics material may be used, such as polyethylene, to give some flexibility to the finished structure.

WHAT WE CLAIM IS:—

1. A binder element for an apertured book or the like, comprising a first spine having a plurality of elongate studs extending therefrom, said studs each having at least on one side thereof a plurality of ratchet teeth, a second mating spine having complementary openings of a size for the reception of said studs, each of said openings being defined by a wall having at least one ratchet tooth thereon extending into said opening and adapted to engage the ratchet teeth on a co-operating stud extending into the opening from the first spine, and locking means adapted to be moved into said openings when the spines are assembled together thereby holding said ratchet teeth of the two spines in engagement with each other.

2. A binder element according to Claim 1 wherein the locking means consists of a series of blocks attached to said second spine, there being one adjacent to each of the openings.

3. A binder element according to Claim 2 wherein each block is joined to the said second spine by a thin web which can be fractured or flexed to permit the said block being inserted into the corresponding opening.

4. A binder element according to Claim 3 wherein each said block is substantially parallel-sided and is constructed so as to be slid into said corresponding opening, thereby fracturing the said web, and requiring to be forced into said opening so as to be a friction fit therein.

5. A binder element according to Claim 3 wherein each said block is constructed so as to be rotatable into said opening and be a friction fit therein.

6. A binder element according to any preceding claim wherein the studs on the first spine have ratchet teeth facing in one direction on one side of the transverse centre line of the respective spine and have teeth facing in the opposite direction on the other side of said centre line.

7. A binder element according to Claim 6 wherein an odd number of studs is employed and wherein the centre stud has ratchet teeth on both sides thereof.

8. A binder element according to any preceding claim wherein said openings in said second spine have a size larger than the dimension of said co-operating studs so as each to freely receive said respective stud.

9. A binder element according to Claim 3 or any claim appendant thereto wherein

each of said openings in said second spine contains a shoulder formed by an undercut in the wall thereof opposite the ratchet tooth, said undercut being arranged so as to receive the portion of the ruptured web still attached to the corresponding block when it has been forced into the opening.

10. A binder element according to Claim 3 or any claim appendant thereto wherein each said block is tapered on an edge opposite the web to reduce binding as the block is forced into the opening, after insertion of the stud, so as to firmly hold the ratchet tooth extending into the opening in engagement with the stud.

11. A binder element according to any preceding claim wherein said plurality of ratchet teeth are formed substantially along the entire length of said studs.

12. A binder element according to any preceding claim wherein said first and second spines are of substantially the same length and width.

13. A binder element according to any of Claims 3 to 12 wherein the size and shape of said blocks is such that after each of the blocks is forced into one of the openings after insertion therein one of the studs to firmly hold the ratchet tooth extending into the opening in engagement with the stud, the exposed surface of the block is flush with the surface of the second spine.

14. A binder element according to any preceding claim when formed from a plastics material.

15. A binder element for an apertured book substantially as herein described and with reference to the accompanying drawings.

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1443113 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 1

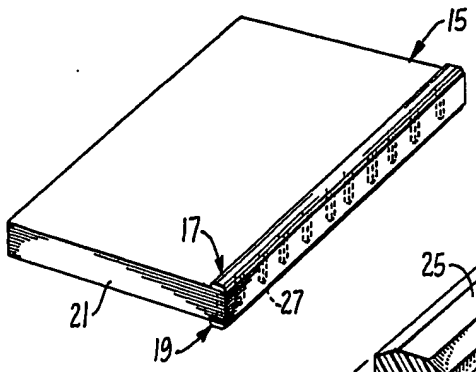

FIG. 1.

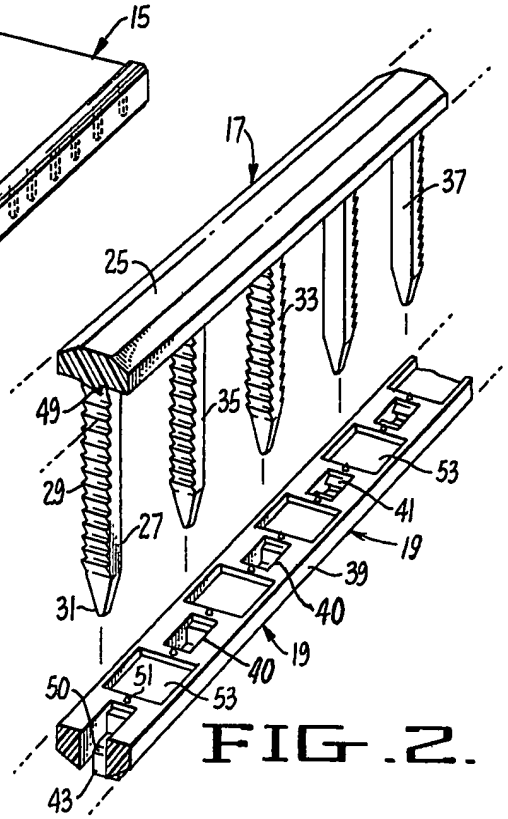

FIG. 2.

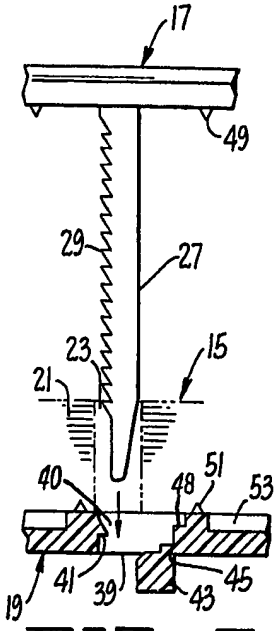

FIG. 3.

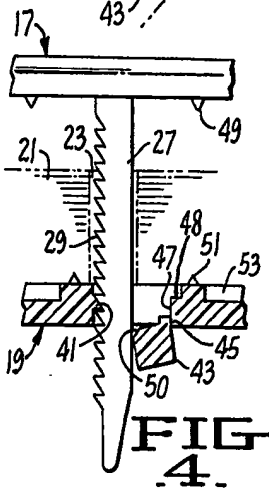

FIG. 4.

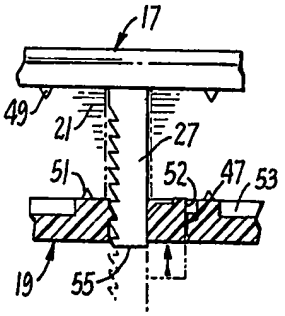

FIG. 5.

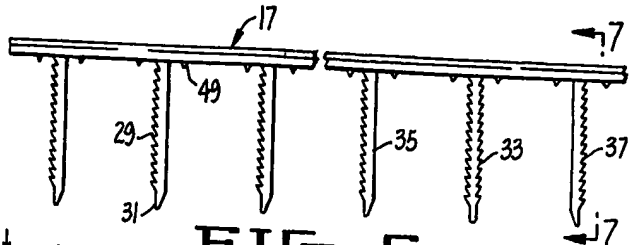

FIG. 6.

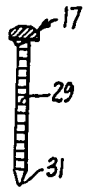

FIG. 7.

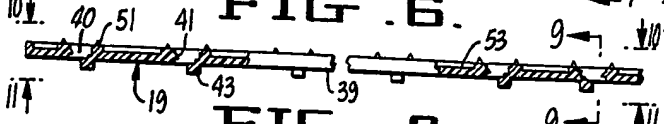

FIG. 8.

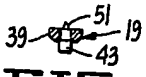

FIG. 9.

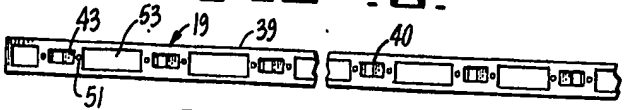

FIG. 10.

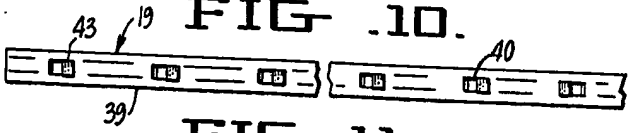

FIG. 11.

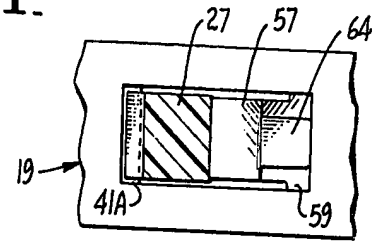

FIG. 14.

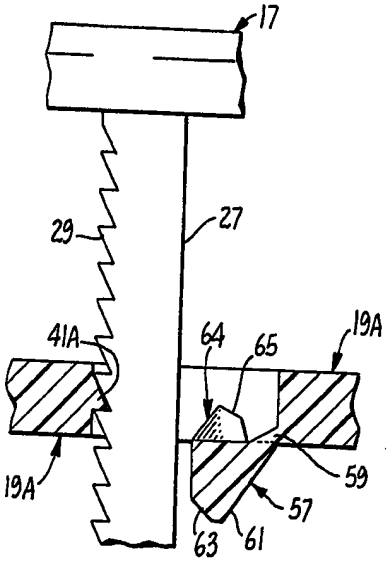

FIG. 12.

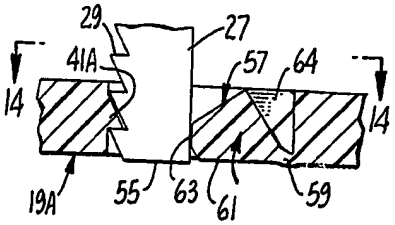

FIG. 13.

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